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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/801,892	03/08/2001	Colin D. Frank	CE08555R	7192
22917	7590	08/10/2005	EXAMINER	
MOTOROLA, INC. 1303 EAST ALGONQUIN ROAD IL01/3RD SCHAUMBURG, IL 60196			WARE, CICELY Q	
			ART UNIT	PAPER NUMBER
			2634	

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/801,892

Applicant(s)

FRANK, COLIN D.

Examiner

Cicely Ware

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-7, 9-17, 20, 22, 23 is/are rejected.
- 7) ☐ Claim(s) 4, 8, 18, 19 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/31/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)     | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments, see **REMARKS**, filed 5/31/2005 with respect to the rejection(s) of claim(s) 1-7, 10-17 and 23 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Gross et al. (US Patent 6,556,809) and Rashid-Farrokhi et al. (US Patent 6,304,750).

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

3. A broad range or limitation falls within the broad range or limitation is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. A claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. In the present instance, **claims 9, 10, 22 and 23** recite the broad recitations "interference approaches infinity", and "reasonable small fraction", respectively.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 5, 6, 11, 12, 13, 15, 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Paulraj et al. (US Patent 6,321,499).

(1) With regard to claim 1, Gross et al. discloses in (Figs. 1 and 2) a method for antenna beamforming in a communication system (Fig. 1 (100)) comprising a plurality of subscriber units (Fig. 1 (130)) and a transmitting communication device (110) having an antenna array (Fig. 2 (204)) comprised of a plurality of array elements (col. 4, lines 10-17), the method comprising a step of jointly optimizing a plurality of weighting coefficients to produce a plurality of optimized weighting coefficients for use by the transmitting communication device in transmission s to the plurality of subscriber units, wherein each optimized weighting coefficient of the plurality of optimized weighting coefficients is associated with an element of the plurality of elements and is further associated with a subscriber unit of the plurality of subscriber units (abstract, col. 1, lines 8-14, 35-38, col. 2, lines 33-40, col. 3, lines 6-12, 23-29, 54-55, col. 4, lines 10-37, 65-67, col. 5, lines 1-1-3, 15-20, col. 7, lines 1-11, 42-45, 7-23, col. 9, lines 44-45, 51-53, col. 10, lines 38-45, col. 12, line 4, 9-16).

(2) With regard to claim 2, claim 2 inherits all the limitations of claim 1. Gross et al. further discloses in (Figs. 1 and 2) modulating a plurality of signals to produce a plurality of modulated signals, where in each signal of the plurality of signals is modulated based on an optimized weighting coefficient of the plurality of optimized weighting coefficients; transmitting each modulated signal of the plurality of modulate signals via an array element of the plurality of array elements (col. 4, lines 10-26, 45-64, col. 9, lines 32-39).

(3) With regard to claim 3, claim 3 inherits all the limitations of claim 1. Gross et al. further discloses wherein the step of jointly optimizing a plurality of weighting coefficients comprises a step of determining values for the plurality of weighting coefficients that jointly maximize a signal-to-noise ratio for each subscriber unit of the plurality of subscriber units (col. 4, lines 45-64, col. 7, lines 51-55, col. 8, lines 3-26, col. 10, lines 36-38-45).

(4) With regard to claim 5, claim 5 inherits all the limitations of claim 1. Gross et al. further discloses approximating one or more terms in a joint optimization expression of a signal-to-noise ratio (SNR) to produce an approximation of the joint optimization expression of an SNR; and independently optimizing a set of weighting coefficients of a plurality of sets of weighting coefficients based on the approximation of the joint optimization expression of an SNR to produce a set of optimized weighting coefficients, wherein each set of optimized weighting coefficients of the plurality of sets of optimized weighting coefficients corresponds to a subscriber unit of the plurality of subscriber units (col. 7, lines 51-55, col. 8, lines 3-26).

(5) With regard to claim 6, see rejection claims 5 and 2.

(6) With regard to claim 11, see rejection of claim 1. Gross et al. further discloses in (Figs. 1 and 2) a plurality of weighters (Fig. 2 (210)), wherein each weighter of plurality of weighters is coupled to an element of the plurality of elements (Fig. 2 (204)) (col. 4, lines 10-26, 45-67); and a processor (Fig. 2 (210)) coupled to each weighter of the plurality of weighters, wherein the processor jointly optimizes a plurality of weighting coefficients for use in transmissions to the plurality of subscriber units (col. 10, lines 36-45).

(7) With regard to claim 12, claim 12 inherits all the limitations of claim 11. Gross et al. further discloses wherein when the communication device transmits data to a subscriber unit of the plurality of subscriber units, the processor provides to each weighter of the plurality of weighters the weighting coefficients associated with the subscriber unit and with the element coupled to the weighter, and wherein each weighter then modulates a signal based on the weighting coefficient received from the processor (col. 4, lines 10-26, 46-67, col. 8, lines 3-23, col. 9, lines 32-39).

(8) With regard to claim 13, claim 13 inherits all the limitations of claim 11. Gross et al. further discloses wherein the processor jointly optimizes a plurality of weighting coefficients by determining values for the plurality of weighting coefficients that jointly maximize a signal-to-noise ratio for each subscriber (col. 8, lines 3-23, col. 10, lines 36-45).

(9) With regard to claim 15, see rejection of claims 1, 5 and 11.

(10) With regard to claim 16, see rejection of claims 15 and 12.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gross et al. (US patent 6,556,809) as applied to claim 5, in view of Rashid-Farrokhi et al. (US Patent 6,304,750).

(1) With regard to claim 7, claim 7 inherits all the limitations of claim 5. However Gross et al. does not disclose wherein each subscriber unit of the plurality of subscriber units comprises a Rake receiver, wherein a covariance of an output of the Rake receiver of each subscriber unit comprises a contribution to the covariance by the other subscriber units of the plurality of subscriber units, wherein the step of approximating one of more terms in a joint optimization expression of an SNR comprises a step of approximating the covariance of an output of the Rake receiver of each subscriber unit with a contribution of the covariance by the other subscriber units.

However Rashid-Farrokhi et al. discloses wherein each subscriber unit of the plurality of subscriber units comprises a Rake receiver, wherein a covariance of an output of the Rake receiver of each subscriber unit comprises a contribution to the covariance by the other subscriber units of the plurality of subscriber units, wherein the step of approximating one of more terms in a joint optimization expression of an SNR comprises a step of approximating the covariance of an output of the Rake receiver of

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each subscriber unit with a contribution of the covariance by the other subscriber units (abstract, col. 1, lines 11-19, col. 4, lines 23-25).

Therefore it would have been obvious to one of ordinary skill in the art to modify Gross et al. in view of Rashid-Farrokhi et al. to incorporate wherein each subscriber unit of the plurality of subscriber units comprises a Rake receiver, wherein a covariance of an output of the Rake receiver of each subscriber unit comprises a contribution to the covariance by the other subscriber units of the plurality of subscriber units, wherein the step of approximating one of more terms in a joint optimization expression of an SNR comprises a step of approximating the covariance of an output of the Rake receiver of each subscriber unit with a contribution of the covariance by the other subscriber units to extract the training sequence as affected by the channel and in order for no bits of the frame to be wasted on the training sequence and additional system capacity can be achieved (Rashid-Farrokhi et al., col. 4, lines 25-34).

(2) With regard to claim 17, see rejection of claims 15 and 7.

### ***Allowable Subject Matter***

8. Claims 4, 8, 14, 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a method for antenna beamforming in a communication system. Prior art references show similar methods but fail to teach: **“the step of jointly optimizing a plurality of**



**weighting coefficients comprises a step of jointly optimizing a plurality of weighting coefficients based on information concerning a plurality of propagation channels and an autocorrelation of background interference and wherein each propagation channel of the plurality of propagation channels is a propagation channel between a subscriber unit of the plurality of subscriber units and an array element of the plurality of array elements”, as in claims 4 and 14; “wherein the transmitting communication device operates in an environment where inter-cell interference dominates intra-cell interference, wherein the step of approximating one or more terms in a joint optimization expression of an SNR comprises a step of assuming that the ratio of intra-cell interference to inter-cell interference is equal to zero”, as in claims 8 and 21; “wherein the approximation of the contribution to the covariance by the other subscriber units comprises the equation as in claim 18”; “wherein the approximation of the contribution to the covariance by the other subscriber units comprises the equation as in claim 19”; “wherein the approximation of the contribution to the covariance by the other subscriber units comprises the equation as in claim 20”.**

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 571-272-3047. The examiner can normally be reached on Monday – Friday, 8-5.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

*Cicely Ware*

cqw  
July 29, 2005



**STEPHEN CHIN**  
**SUPERVISORY PATENT EXAMINE**  
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